

# Combating Malaria Through E-SISMAL: How Perceived Quality, Perceived Ease of Use, and Perceived Usefulness Impact Performance? A Case of West Papua Province

**Chandra Leonard Kandami\***

Faculty of Informatics Engineering,  
University of Papua  
Manokwari, West Papua, 98312, Indonesia  
[chandrakandami03@gmail.com](mailto:chandrakandami03@gmail.com)

**Dedi I. Inan**

Faculty of Informatics Engineering,  
University of Papua  
Manokwari, West Papua, 98312, Indonesia  
[d.inan@unipa.ac.id](mailto:d.inan@unipa.ac.id)

**Ratna Juita**

Faculty of Informatics Engineering,  
University of Papua  
Manokwari, West Papua, 98312, Indonesia  
[r.juita@unipa.ac.id](mailto:r.juita@unipa.ac.id)

**Muhammad Indra**

Faculty of Informatics Engineering,  
University of Papua  
Manokwari, West Papua, 98312, Indonesia  
[m.indra@unipa.ac.id](mailto:m.indra@unipa.ac.id)

## Abstract

*Malaria remains a serious health threat in Indonesia, particularly in the West Papua Province. To address this, the Indonesian Ministry of Health developed the Malaria Surveillance Information System (E-SISMAL) to monitor and prevent the disease. However, the effectiveness of this system needs to be evaluated to determine how well it performs in addressing the intended problem. This study aims to investigate the system's performance by integrating the Task-Technology Fit (TTF), Technology Acceptance Model (TAM), and DeLone & McLean Information Systems (D&M IS) Success models. Data from 108 government health clinics in West Papua Province were collected using questionnaires and analyzed using a partial least squares structural equation model (PLS-SEM). The findings revealed that both service quality ( $p = 0.035$ ) and ease of use ( $p = 0.014$ ) significantly influenced user satisfaction ( $R^2 = 38.4\%$ ), which subsequently affected system performance ( $p < 0.000$ ,  $R^2 = 11.6\%$ ). However, information quality and usefulness were not primary concerns for the health clinics in this context. Given these results, it is unsurprising that malaria prevention efforts in this region remain challenging. These findings raise questions about the alignment of the developed system with its objectives, suggesting that it may need reassessment and reconfiguration to achieve its overarching goals. The study concludes with implications and future research directions.*

**Keywords:** E-SISMAL, Information System, Perceived Quality, Impact of Performance, Technology Acceptance Model

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\* Corresponding Author

## Introduction

Malaria remains one of the leading causes of disease and death worldwide, particularly in tropical and subtropical regions. In 2019, an estimated 229 million malaria cases were recorded across 87 endemic countries. Children under the age of five accounted for approximately 67% of malaria-related deaths globally ([Asmiani et al., 2021](#)). This alarming statistic has made malaria a persistent global health challenge, prompting international commitments such as the 2007 World Health Assembly (WHA) resolution and the 2015 Asia-Pacific Regional Commitment to accelerate malaria elimination.

Indonesia is one of the countries where malaria is endemic, with indigenous cases still prevalent in various regions. In 2021, the country reported a malaria case fatality rate of 10 per 100,000 population at risk ([Asmiani et al., 2021](#)). The burden is especially concentrated in the eastern part of the country, including provinces such as Papua, West Papua, East Nusa Tenggara (NTT), Maluku, and North Maluku. Malaria has wide-ranging impacts beyond health, contributing to high infant and under-five mortality rates, and hindering national development due to its social and economic consequences.

In West Papua Province, malaria remains a serious public health issue. Although the Annual Parasite Incidence (API) declined from 31.29 in 2015 to 7.75 in 2018, this figure still places the region in the High Case Incidence (HCI) category, defined as an API greater than 5 ([Erawati et al., 2021](#)). Despite the reduction, the data indicate that malaria transmission remains a significant threat, particularly in remote areas with limited access to healthcare and surveillance infrastructure.

To support malaria prevention and surveillance efforts, the Indonesian Ministry of Health developed the Electronic Surveillance Information System for Malaria (E-SISMAL). This system is designed to improve the validity and efficiency of malaria case recording and reporting. The Ministry of Health has also developed E-SISMAL, with the latest version, E-SISMAL V2, introduced in 2018 and in full use since 2019, with over 9,155 health facilities reporting malaria data through this system. The system enables timely input of patient data, classification of malaria cases, documentation of interventions, and access to real-time information dashboards to support policy decisions. Despite its potential, challenges remain in data completeness, accuracy, and user capacity—especially in regions like West Papua ([Sitompul et al., 2022](#)).

This study examines the influence of Perceived Quality on E-SISMAL Performance in malaria prevention efforts, by integrating Task-Technology Fit (TTF), TAM, and the DeLone & McLean IS Success Model. Different from previous studies, this research also adds an external variable, namely user satisfaction as a mediator, to understand how system quality impacts the work effectiveness of health workers. By analyzing this relationship, this study can provide more comprehensive insight into the effectiveness of health information systems in supporting malaria surveillance programs and provide recommendations for improving the quality of E-SISMAL services in Indonesia.

Several previous studies have examined the E-SISMAL Information System in Indonesia. For example, a study by [Asmiani et al. \(2021\)](#) aimed to evaluate the effectiveness of malaria vector control strategies using retrospective data from the Electronic Malaria Surveillance Information System (E-SISMAL), using the HOT-Fit (Human, Organization, Technology-Fit) model. In addition, a study by [Indrayana & Ariawan \(2022\)](#) focused on evaluating the implementation of the Malaria Surveillance Information System (SISMAL) within the jurisdiction of the Malang City Health Office, using the CIPP (Context, Input, Process, Product) Evaluation Model. These previous studies have primarily focused on the operational and organizational challenges in E-SISMAL implementation, including limited human resources, lack of structured training, and suboptimal data reporting mechanisms. However, these studies did not explicitly investigate how users' perceptions of system quality, perceived ease of use, and perceived usefulness affect performance outcomes. For example, [Asmiani et al. \(2021\)](#) identified challenges in cross-sector collaboration and funding limitations, but did not assess user-perceived quality or system impact on performance. Similarly, [Indrayana & Ariawan \(2022\)](#) noted that users found SISMAL helpful and simple but lacked frequent use and formal training, with no analysis of how these factors influence work effectiveness. Additionally, both studies were conducted in relatively low-endemic areas, limiting the generalizability to high-burden settings. Therefore, to address this gap, a quantitative analysis was conducted on the relationship

between perceived quality, perceived ease of use, perceived usefulness, and user performance in the context of West Papua, which faces distinct infrastructural and epidemiological challenges.

## Theoretical Background

This research focuses on the influence of Perceived Quality on E-SISMAL Performance in malaria prevention efforts. Digital-based information systems, such as E-SISMAL, play an important role in managing public health data, especially in monitoring and controlling infectious diseases such as malaria. However, the effectiveness of these systems depends not only on their existence, but also on the extent to which users perceive the system to be of good quality (Perceived Quality) and how this impacts the performance of the system in supporting the tasks of health workers.

According to various theories in the field of information systems, good information system quality will increase user satisfaction and performance, which in turn will have an impact on the effectiveness and sustainability of using the system. To understand the relationship between Perceived Quality and E-SISMAL Performance, this study refers to three main models, namely Task-Technology Fit (TTF), Technology Acceptance Model (TAM), and DeLone & McLean IS Success Model.

### *Electronic Surveillance Information System for Malaria (E-SISMAL)*

Electronic Surveillance Information System for Malaria (E-SISMAL) is a web-based information system developed by the Indonesian Ministry of Health to support malaria control and elimination efforts. This system is designed to record and monitor malaria case data nationwide through core features such as inputting case data based on classification (local, imported, relapse), reporting laboratory results, documenting treatment and intervention measures, and visualizing epidemiological data through an interactive dashboard ([Sitompul et al., 2022](#)). Additionally, E-SISMAL provides location-based tracking that enables the mapping of endemic areas and identification of transmission clusters ([Asmiani et al., 2021](#)).

The main users of this system include surveillance officers at community health centers (Puskesmas), clinics, hospitals, district and provincial health offices, as well as national-level malaria program managers. In practice, E-SISMAL has proven effective in improving the accuracy and speed of case reporting compared to previous manual methods, while also enhancing data coverage and consistency ([Herawati et al., 2023](#)). Nevertheless, the system still faces challenges, particularly regarding limited internet access in remote areas, varying levels of user capacity, and the need for integration with other health information systems ([Indrayana & Ariawan, 2022](#)).

### *Task-Technology Fit (TTF)*

Task-Technology Fit (TTF) theory, introduced by [Goodhue \(1998\)](#), posits that the effectiveness of a technology is determined by how well it supports the tasks its users need to perform. In the context of this study, E-SISMAL must align with the daily operational tasks of healthcare workers, particularly in recording, classifying, and reporting malaria cases. If the system offers functionalities that facilitate these tasks—such as structured data input, real-time case tracking, and epidemiological dashboards—then it can be considered to have a high level of task-technology fit. [Tam and Oliveira \(2016\)](#) assert that TTF is widely used in evaluating whether information systems improve individual and organizational performance. This alignment becomes crucial, especially in settings like Papua Barat, where the effectiveness of public health interventions depends on the speed and accuracy of data.

In this study, the effectiveness of E-SISMAL is evaluated using the variable Impact of Performance (IOP), which measures how system use translates into improved task outcomes for healthcare workers. IOP reflects whether the system contributes to faster, more accurate, and more efficient completion of malaria-related duties, such as entering lab results, stock data, and responding to outbreaks. Several empirical studies validate the link between TTF and performance impact. [Yen et al. \(2010\)](#) found that a strong fit between technology and task promotes better adoption and integration of systems into daily workflows. Similarly, [Franque et al. \(2021\)](#) emphasized that when users perceive a system as supportive of their tasks, they are more likely to use it consistently and

productively. In addition, [Saputra et al. \(2024\)](#) showed that in digital public service contexts, perceived task fit significantly enhances not only system usage but also satisfaction and outcome performance. Therefore, the inclusion of IOP in this study is essential to capture the practical, work-related benefits of E-SISMAL and to understand how well the system supports malaria prevention in Indonesia.

### ***Technology Acceptance Model (TAM)***

The Technology Acceptance Model (TAM), developed by [Davis \(1989\)](#), explains that user acceptance of a technology is primarily determined by two key beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU refers to the degree to which an individual believes that using a specific system enhances job performance. In the context of this study, health workers must perceive E-SISMAL as beneficial in improving the accuracy, speed, and efficiency of malaria case reporting and data management. When users believe that the system contributes directly to their effectiveness, they are more likely to consistently use it. This aligns with findings from [Hermawan and Paramita \(2021\)](#), who showed that PU significantly influences user satisfaction and the intention to continue using m-health applications in Indonesia. Similarly, [Sitompul et al. \(2022\)](#) highlighted the strategic role of E-SISMAL in aiding decision-making for malaria control, reinforcing the perception of its usefulness among frontline healthcare staff.

Meanwhile, PEOU relates to the extent to which users find a system free of effort to learn and operate. For E-SISMAL to be integrated effectively into health workers' routines—especially in resource-limited areas like Papua—it must offer a user interface and workflow that are intuitive and accessible. If users perceive the system as too complex or burdensome, they are unlikely to adopt it fully, regardless of its potential usefulness. Research by [Herawati et al. \(2023\)](#) demonstrated that E-SISMAL's web-based, mobile-friendly design was crucial in enabling healthcare workers in remote areas to perform digital reporting with minimal training. Further, [Inan et al. \(2022\)](#) found that ease of use strongly predicts user acceptance of mobile technology in service sectors, while [Setiawati et al. \(2024\)](#) observed that in regions with low digital literacy, PEOU plays a more dominant role than PU in influencing users to continue using the technology. In this study, PU and PEOU are modeled as antecedents to user satisfaction, offering a pathway to evaluate how E-SISMAL's perceived design quality shapes its perceived effectiveness and continued use.

### ***DeLone & McLean Information System (IS) Success Model***

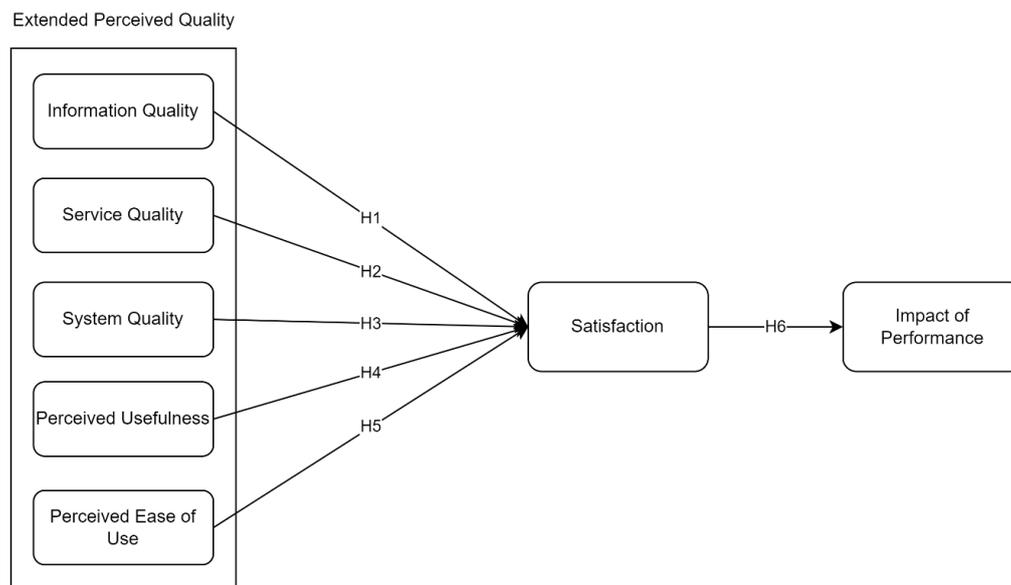
The DeLone & McLean Information System (IS) Success Model, developed by [DeLone and McLean \(2003\)](#), offers a comprehensive framework to evaluate the success of information systems through six interconnected dimensions: system quality, information quality, service quality, system use, user satisfaction, and net benefits. In this study, the focus is on perceived quality, encompassing three critical components: system quality (e.g., speed, stability, and usability), information quality (e.g., accuracy and relevance), and service quality (e.g., training and technical support). These elements are key in shaping user satisfaction and perceived system effectiveness. [Franque et al. \(2021\)](#) found that perceived quality strongly influences continued usage of mobile-based technologies. In the health context, [Tam and Oliveira \(2016\)](#) also noted that digital systems with high usability and relevance improve user performance. Similarly, [Herawati et al. \(2023\)](#) emphasized that the readiness of services and technical infrastructure supports efficient reporting in Indonesian health centers.

In the E-SISMAL context, health workers need to experience the system as reliable, helpful, and easy to operate to maintain consistent use, especially in remote regions such as West Papua. The system must provide accurate and timely malaria data, function smoothly across various levels of infrastructure, and offer accessible technical support. When these dimensions are met, users are more likely to be satisfied and continue using the system, contributing to better surveillance and decision-making in malaria control. [Setiawati et al. \(2024\)](#) supported this by showing that in areas with limited digital literacy, service quality often plays a more influential role than technical sophistication in driving system adoption. As such, the IS Success Model provides a valuable lens to understand how

E-SISMAL's design and support structure can influence satisfaction and ultimately enhance its effectiveness in disease prevention programs.

### **Research Model and Hypotheses Development**

This study uses quantitative research methods. Quantitative method is a research method that uses numerical and statistical data to measure, analyze, and explain the phenomenon or variable under study (Anjani et al., 2024; Hair et al., 2014). This study integrates three key models—Task-Technology Fit (TTF), the Technology Acceptance Model (TAM), and the DeLone & McLean Information System (IS) Success Model—to form a comprehensive framework for evaluating the performance of the E-SISMAL system in supporting malaria prevention efforts in West Papua. The DeLone & McLean model is used to assess perceived quality through three core dimensions: information quality, system quality, and service quality, all of which are designed to influence user satisfaction. The TAM model explains effectiveness and continued use through the constructs of perceived ease of use and perceived usefulness, which also affect user satisfaction. Meanwhile, the TTF model contributes by emphasizing the alignment between the tasks performed by healthcare workers and the capabilities of the system, measured by the variable “Impact of Performance”. In this framework, user satisfaction functions as a mediating variable that connects perceived quality to the system's performance outcomes.



**Figure 1. Research Model**

Based on [Figure 1](#), each variable is interconnected. Information quality is one of the key components of an information system that influences user satisfaction. According to a study by Franque et al. (2021), information quality encompasses aspects such as completeness, accuracy, relevance, and timeliness, all of which contribute to users' perceptions of the system. In the context of E-SISMAL, a study by [Asmiani et al. \(2021\)](#) showed that delays and inaccuracies in malaria reporting often occur due to a lack of clarity in the information and confusing system features for field users. This reduces the satisfaction of surveillance officers with the system. Additionally, [Indrayana and Ariawan \(2022\)](#) also found that the completeness and accuracy of data reporting in E-SISMAL play a crucial role in supporting decision-making for malaria control. In this study, E-SISMAL is used to collect, manage, and report malaria surveillance data, making high-quality information essential for effective decision-making by healthcare professionals. If the system provides clear, up-to-date, and accurate data, it can enhance users' trust in the system and their satisfaction with its use. Therefore, hypothesis one is raised, namely:

**H1: Information quality has a positive effect on user satisfaction in using the E-SISMAL Health Information System.**

Service quality refers to the level of support users receive from the system provider, including responsiveness, reliability, technical competence, and empathy of the information system ([Franque et al., 2021](#)). In the context of E-SISMAL, a study by [Asmiani et al. \(2021\)](#) revealed that many surveillance officers experienced difficulties accessing technical support during reporting disruptions, along with slow responses from the system management team. This reduced users' comfort and satisfaction with the system. Furthermore, a study by [Herawati et al. \(2023\)](#) found that technical support services and the clarity of E-SISMAL user instructions significantly influenced the satisfaction levels of surveillance officers in using the system. In this study, where E-SISMAL is implemented in public health facilities, the technical support provided to healthcare workers—such as assistance with troubleshooting, training, or responding to user feedback—is crucial for ensuring smooth operations. Timely and helpful support services can have a significant impact on the user experience and overall satisfaction with the system. Thus, hypothesis two is:

**H2: Service quality has a positive effect on user satisfaction in using the E-SISMAL Health Information System.**

System quality reflects the technical functionality of an information system, such as speed, reliability, ease of navigation, and user interface design ([Franque et al., 2021](#)). In the context of E-SISMAL, a study by [Indrayana and Ariawan \(2022\)](#) stated that E-SISMAL has a fast response time and a comprehensive menu of options, although it features an outdated design; this can still enhance user satisfaction with the system. Additionally, research by [Herawati et al. \(2023\)](#) indicated that although E-SISMAL is web-based, issues such as the low usage of Population Identification Number/Nomor Induk Kependudukan (NIK) or International Classification of Diseases (ICD) codes, lack of integration with other systems, and data storage problems highlight the system's low quality in certain aspects. To ensure E-SISMAL's effectiveness, especially in remote or resource-limited areas, the system must be accessible, stable, and user-friendly. If healthcare workers find the system easy to operate and reliable, they are more likely to feel satisfied using it in their daily reporting and surveillance tasks. Therefore, hypothesis three is raised, namely:

**H3: System quality has a positive effect on user satisfaction in using the E-SISMAL Health Information System.**

[Hermawan and Paramita \(2021\)](#) describe perceived usefulness as the extent to which users believe that a system enhances their job performance. A study by [Herawati et al. \(2023\)](#) stated that E-SISMAL is used for routine reporting and serves as a key support tool in malaria elimination efforts. The system is considered to have strategic value for policy-making at various levels, which can enhance the perceived usefulness and, in turn, user satisfaction. Furthermore, research by [Sitompul et al. \(2022\)](#) noted that the main objective of E-SISMAL is to improve data visualization and analysis, as well as support decision-making, strongly reflecting the system's usefulness to its users, which can also contribute to higher satisfaction. In the case of E-SISMAL, when users perceive that the system helps them manage malaria data more efficiently—such as through quicker data entry, easier data retrieval, and improved monitoring—they are more likely to be satisfied with the system. Based on this, the following is hypothesis four:

**H4: Perceived usefulness has a positive effect on user satisfaction in using the E-SISMAL Health Information System.**

According to [Hermawan and Paramita \(2021\)](#), perceived ease of use refers to the extent to which a system is easy to learn and operate without significant effort. In the context of E-SISMAL, a study by [Herawati et al. \(2023\)](#) showed that the system is designed to be easily operated in remote areas, is available in a web-based version, and supports mobile-friendly reporting. This strengthens the perception of ease of use, which can influence user satisfaction. Additionally, research by [Sitompul et al. \(2022\)](#) stated that E-SISMAL was developed to simplify online data entry, aiming to ensure that the system can be used more efficiently by all users. E-SISMAL is used by healthcare workers with varying levels of technological literacy, so an intuitive interface and streamlined functions are crucial for reducing the learning curve. If users find the system simple and straightforward to use, this will contribute positively to their satisfaction. Based on this, the following is hypothesis five:

**H5: Perceived ease of use has a positive effect on user satisfaction in using the E-SISMAL Health Information System.**

[Franque et al. \(2021\)](#) define performance impact as the measurable improvement in user or organizational performance resulting from the use of a system. A study by [Herawati et al. \(2023\)](#) stated that system readiness and availability are key determinants of the success of malaria programs. In other words, the use of E-SISMAL, when accompanied by user satisfaction, can improve reporting accuracy, response speed, and malaria elimination efforts. Furthermore, research by [Indrayana and Ariawan \(2022\)](#) showed that satisfied users experienced improved performance and work efficiency through the use of E-SISMAL. In the case of E-SISMAL, high user satisfaction may lead to more consistent and effective system use, which can enhance data accuracy, timeliness of malaria reporting, and responsiveness to outbreaks. Consequently, the system's contribution to improving public health outcomes will be more significant. Based on this, the following is hypothesis six:

**H6: User satisfaction has a positive effect on the performance impact of the E-SISMAL Health Information System.**

## Research Methodology

### Sample

The target population of this study is all health workers in all hospitals, health centers, and health services in West Papua Province who use the E-SISMAL application in carrying out their duties. This approach was used because it was necessary to ensure that respondents met the criteria mentioned earlier. Respondent data was collected using a questionnaire (via Google Form) with statements regarding the use of the E-SISMAL application. The sample was determined using non-probability sampling, and respondents were willing to provide data; then the research data was processed using PLS- SEM ([Hair et al., 2014](#)). The authors also used the G\*Power tool to assess the validity of the analysis. Setting the effect size at 0.15, alpha significance level at 5%, power of analysis at 95%, and using nine predictor variables, the minimum sample size required is 75 respondents ([Kock & Hadaya, 2018](#)). However, we collected more than enough data, namely 108 respondents' data.

The survey and data collection process were carried out for three months from October to December 2024, in all health work units in West Papua Province, with a total of 108 valid respondents. Demographic data collected included gender, age, highest level of education, and work unit. The explanation can be seen in [Table 1](#). The work units are not shown in [Table 1](#) because the respondents are health workers from various hospitals, health centers, and health offices throughout West Papua Province (there are many work units).

**Table 1. Demographic Description of Respondents**

Category	Item	Total	Percentage
Gender	Male	43	33,3%
	Female	85	66,7%
Age	18-35 Years	51	47,2%
	36-50 Years	67	52,8%
	> 51 Years	-	-
Last Education	High School/Vocational School/Equivalent	-	-
	Diploma (D1/D2/D3)	44	40,7%
	Bachelor's Degree (S1)	64	59,3%
	Master's Degree (S2)	-	-

## Analysis Method

In the previous section, it was explained that this research uses the Structural Equation Modeling-Partial Least Squares (SEM-PLS) method with the SmartPLS application. This method was chosen because it is capable of analyzing complex research models even with a relatively small sample size and non-normally distributed data. In this section, the characteristics of the respondents who participated in the research are described.

## Results

### Measurement Model Evaluation

The measurement model analysis in this study was carried out with validity and reliability tests. To assess convergent validity, the Loading Factor (LF) test is used. In the outer loading test, we analyze the loading factor or the relationship between the indicator score and the intended construct. A factor loading is considered valid if the indicator value is greater than 0.7 ([Inan et al., 2022](#)). Then the Average Variance Extracted (AVE) value must be 0.5 or greater ([Hair et al., 2014](#)). An AVE value of 0.5 or more indicates that the construct can explain more than 50% of the indicator variation ([Sarstedt et al., 2020](#)). Then, the reliability test on each variable is carried out using two methods, namely Cronbach's Alpha (CA) and Composite Reliability (CR). All indicators of each variable are considered reliable if the CA and CR values are greater than 0.70 ([Inan et al., 2022](#); [Sayyida, 2023](#)). In this study, the confirmatory analysis of the variables is presented in [Table 2](#).

**Table 2. Confirmatory Variable Results**

Construct	Statement	Code	LF
Information Quality (IQ) ( <a href="#">Saputra et al., 2024</a> ) CA, CR, AVE = 0.817, 0.890, 0.730	I feel that the information obtained from the E-SISMAL Application is reliable.	IQ1	0.811
	I feel that the information obtained from the E-SISMAL Application is up-to-date.	IQ2	0.942
	I find it easy to understand the information obtained from the E-SISMAL Application.	IQ3	0.783
Service Quality (SQ) ( <a href="#">Franque et al., 2021</a> ) CA, CR, AVE = 0.817, 0.890, 0.730	I find the information system services of the E-SISMAL Application reliable.	SQ1	0.867
	I believe in the ability of the E-SISMAL Application to provide quality services.	SQ2	0.883
	I feel that the data of the E-SISMAL Application can be updated easily and quickly.	SQ3	0.811
System Quality (STQ) ( <a href="#">Franque et al., 2021</a> ) CA, CR, AVE = 0.814, 0.845, 0.650	I find the E-SISMAL Application easy to use.	STQ1	0.731
	I find the E-SISMAL Application easy to learn.	STQ2	0.709
	I feel that I have no problems whatsoever when using the E-SISMAL Application.	STQ3	0.955
Perceived Ease Of Use (PEOU) ( <a href="#">Yen et al., 2010</a> ) CA, CR, AVE = 0.778, 0.870, 0.692	I find the E-SISMAL Application easy to use to enter patient malaria test results data, drug stock data, and cadre monitoring.	PEO U1	0.868
	It is very easy for me to understand how the E-SISMAL Application works to enter examination data, drug stock, and others.	PEO U2	0.866
	I find it easy to enter test results data and drug stock using the E-SISMAL Application.	PEO U3	0.757
Perceived Usefulness	The E-SISMAL Application helps me complete my work	PU1	0.908

Construct	Statement	Code	LF
(PU) ( <a href="#">Franque et al., 2021</a> ) CA, CR, AVE = 0.867, 0.918, 0.788	without obstacles.		
	The E-SISMAL Application makes it easier for me to enter the results of malaria disease examinations.	PU2	0.856
	The E-SISMAL Application is very helpful for me to enter patient malaria test results and drug stock quickly and easily.	PU3	0.899
Satisfaction (ST) ( <a href="#">Inan et al., 2023</a> ) CA, CR, AVE = 0.835, 0.900, 0.751	The E-SISMAL Application improves the quality of the patient malaria test result data that I collect.	ST1	0.875
	I am satisfied with the performance of the E-SISMAL Application.	ST2	0.856
	I have no difficulty in carrying out my duties using the E-SISMAL Application.	ST3	0.868
Impact Of Performance (IOP) ( <a href="#">Tam &amp; Oliveira, 2016</a> ) CA, CR, AVE = 0.771, 0.866, 0.683	I feel that the functions of the E-SISMAL Application make users feel satisfied when completing tasks because it is fast and easy.	IOP1	0.784
	The E-SISMAL Application makes it easier for me to enter patient malaria test results and drug stock data, so I can work faster and more efficiently.	IOP2	0.887
	The E-SISMAL Application makes me work faster and more efficiently in completing my tasks related to malaria test result reports.	IOP3	0.805

After the confirmatory test shows that the data used in this study are good and meet the criteria for testing convergent validity and reliability, the next criterion is to assess discriminant validity. The purpose of discriminant validity is to measure that each construct is unique and is used to represent phenomena that are not represented by other constructs ([Inan et al., 2023](#)). In this study, to assess Discriminant Validity, the Heterotrait-Monotrait Ratio (HTMT) test was conducted, which compares the relationship between different latent variables with the relationship between indicators in the same variable. The HTMT value meets the criteria if the value is  $<0.85$  or  $<0.9$  ([Sarstedt et al., 2020](#); [Setiawati et al., 2024](#)). The results of the HTMT test in this study show a good value and can be seen in [Table 3](#). From [Table 3](#), it can be seen that the Discriminant Validity value using the HTMT test is accepted, because it meets the previously mentioned value criteria, which is  $<0.9$ .

**Table 3. Discriminant Validity (HTMT)**

	IOP	IQ	PEOU	PU	SQ	ST	STQ
IOP							
IQ	0.421						
PEOU	0.464	0.435					
PU	0.199	0.121	0.219				
SQ	0.277	0.561	0.552	0.163			
ST	0.404	0.345	0.634	0.326	0.554		
STQ	0.527	0.230	0.314	0.258	0.120	0.184	

### Structural Model Evaluation

After evaluating the construct measurement model, the next step is to evaluate the structural model. Structural Model Evaluation is a model that explains and predicts the relationship between one variable and another in a study. For the internal structural model, a collinearity test must be performed

before running the hypothesis test to ensure that the Variance Inflation Factor (VIF) value does not exceed or equal 5. The construct values associated with  $VIF \geq 5$  and  $\leq 0.2$  indicate that they have a collinearity problem (Inan et al., 2023). Based on the results of data processing in Table 4, it can be seen that the VIF value of each construct has a prediction  $> 0.2$  and  $< 5$ , which means there is no collinearity problem.

**Table 4. Variance Inflation Factor (VIF)**

	IOP	IQ	PEOU	PU	SQ	ST	STQ
IOP							
IQ						1.475	
PEOU						1.363	
PU						1.099	
SQ						1.573	
ST	1.000						
STQ						1.143	

There is also a hypothesis test. The purpose of hypothesis testing is to determine whether the data obtained is strong enough to reject the null hypothesis and accept the alternative hypothesis. This process is carried out by comparing the T-statistics and P-values through the bootstrap method. The hypothesis is considered accepted if the T Statistic values  $> 1.96$  and P Values  $< 0.05$  (Inan et al., 2020; Saputra et al., 2024). The following are the results of the structural model evaluation of the hypothesis testing that has been carried out and presented in Table 5. Of the six hypotheses proposed, three hypotheses have T-statistic values  $> 1.96$  and P-values  $< 0.05$ , which indicates that the hypothesis is accepted. Meanwhile, the other three hypotheses have T-statistic values  $< 1.96$  and P-values  $> 0.05$ , which indicates that the hypothesis is rejected.

There is also a coefficient of determination test. According to Furdantin (2018), the coefficient of determination (R-Square) is a tool used to measure the extent of the influence of the independent variable on the dependent variable. The R-Square value is expected to be between 0 and 1. An R-Square value of 0.75 indicates that the model has good power, while a value of 0.50 reflects moderate model power. On the other hand, a value of 0.25 indicates that the model is relatively weak (Inan et al., 2023; Risdiyanto et al., 2024).

**Table 5. Hypothesis Test Results**

Hypothesis	Variables	T Statistics	P Values	Description
H1	IQ $\rightarrow$ ST	1.199	0.231	Rejected
H2	SQ $\rightarrow$ ST	2.117	0.035	Accepted
H3	STQ $\rightarrow$ ST	0.465	0.642	Rejected
H4	PEOU $\rightarrow$ ST	2.455	0.014	Accepted
H5	PU $\rightarrow$ ST	1.952	0.052	Rejected
H6	ST $\rightarrow$ IOP	4.261	0.000	Accepted

Based on Table 6, it can be seen that the R-square value for the Satisfaction variable is 0.384, which shows that the Information Quality, Service Quality, System Quality, Perceived Ease of Use, and Perceived Usefulness variables affect the Satisfaction variable by 38.4% and have moderate predictive power on satisfaction. Furthermore, the R-Square value for the Impact of Performance variable is 0.116, which shows that the Satisfaction variable can explain the influence on the Impact of Performance variable by 11.6% and has a weak predictive power on Impact of Performance.

**Table 6. Determinant Coefficient (R-Square)**

	R Square	Description
ST	0.384	Moderate
IOP	0.116	Weak

## Discussion

Based on the hypothesis test results in [Table 5](#), Information Quality (H1) does not significantly affect satisfaction (t-statistic = 1.199, p-values = 0.231). This result contradicts the findings of a previous study by [Franque et al. \(2021\)](#), in which information quality was found to have a positive influence on user satisfaction. This may be due to users perceiving the provided information as sufficient or standardized, thereby reducing its overall impact on user satisfaction. As for Service Quality (H2), it has a significant effect on satisfaction with a t-statistic > 1.96 and p-values is < 0.05 (t-statistic = 2.117, p-values = 0.035), where this hypotheses contradict with previous research by [Franque et al. \(2021\)](#). It can be concluded that information quality does not have much impact on user satisfaction, but service quality significantly influences user satisfaction when using the E-SISMAL health information system.

However, System Quality (H3) does not significantly affect satisfaction (t-statistic = 0.465, p-values = 0.642). This result is consistent with the findings of a previous study by [Franque et al. \(2021\)](#), which suggests that users have adapted to the system or have relatively low expectations, thereby minimizing the role of system quality in shaping satisfaction. Likewise, Perceived Usefulness (H5) does not significantly affect satisfaction (t-statistic = 1.952, p-values = 0.052). This result contradicts the findings of a previous study by [Hermawan and Paramita \(2021\)](#), which shows that perceived usefulness has a positive influence on user satisfaction. This suggests that, while users may view the system as useful, the perceived usefulness may not be strong or consistent enough to significantly impact their satisfaction. This indicates that system quality and perceived usefulness do not significantly influence user satisfaction in using the E-SISMAL information system.

Additionally, Perceived Ease of Use (H4) has a significant effect on satisfaction with a t-statistic > 1.96 and p-values is < 0.05 (t-statistic = 2.455, p-values = 0.014), which is in line with previous research by [Hermawan and Paramita \(2021\)](#). As for, Satisfaction (H6) significantly affects Impact of Performance (t-statistic = 4.261, p-values = 0.000), consistent with [Franque et al. \(2021\)](#). Overall, factors such as service quality, perceived ease of use, and satisfaction positively influence user adoption of the E-SISMAL Health information system. While information quality, system quality, and perceived usefulness do not significantly influence user intention to use the E-SISMAL Health information system.

In terms of predictive power, an  $R^2$  value for satisfaction is 0.384, indicating a moderate level of predictive power. This suggests that the variables in the current model—information quality, system quality, service quality, perceived ease of use, and perceived usefulness—moderately explain 38.4% of user satisfaction with the E-SISMAL system. The remaining 61.6% may be explained by other variables not examined in this research model.

In contrast, the  $R^2$  value for Impact of Performance is 0.116, which shows that the Satisfaction variable can explain the influence on the Impact of Performance variable by 11.6%, reflecting weak predictive power and indicating that a substantial portion of the variance in system performance remains unexplained. This suggests that, although user satisfaction contributes to system performance, the remaining 88.4% may be explained by other variables not examined in this research model. These findings underscore the need to further investigate external and organizational factors that may influence the actual performance impact of E-SISMAL, particularly within the unique healthcare context of West Papua.

## Implications

### *Theoretical Implications*

This study contributes to the theoretical advancement of information systems by integrating three prominent models (Task-Technology Fit (TTF), the Technology Acceptance Model (TAM), and the DeLone & McLean IS Success Model) to examine the factors that influence user satisfaction and system performance in the context of E-SISMAL. The integration of these models provides a more comprehensive framework for understanding how system-related factors and user perceptions affect the effectiveness of digital health systems.

The results indicate that service quality and perceived ease of use have a significant positive effect on user satisfaction, which in turn enhances system performance. Conversely, information quality, system quality, and perceived usefulness did not significantly influence satisfaction. These findings challenge some prior research and highlight the importance of contextual factors in shaping user perceptions and system success.

Moreover, the study highlights the importance of user satisfaction as a mediating variable, emphasizing that the effectiveness of a system is influenced not only by its technical capabilities but also by the quality of user experience and the ease of system interaction. This finding provides an extension to the TAM framework by indicating that perceived ease of use may have a more substantial impact than perceived usefulness, especially in healthcare environments with limited infrastructure.

In addition to the role of user satisfaction highlighted through TAM, the conceptual foundation of Task-Technology Fit (TTF) also plays an important part in understanding the outcome of system usage in this study. Although TTF is not modeled as a standalone construct in the analysis, it conceptually underpins the relationship between user satisfaction and performance impact. TTF emphasizes that a system's success depends not only on user perceptions but also on how well it supports the completion of specific tasks. In this study, performance improvement—captured through the Impact of Performance variable—reflects the degree of alignment between the system and the tasks of healthcare workers. The significant effect of user satisfaction on performance impact reinforces the importance of task-technology alignment, particularly in resource-limited settings like West Papua.

In conclusion, the findings offer a theoretical foundation for developing more context-sensitive models in evaluating the success of information systems, particularly in the public health sector. Prioritizing usability and service support in system design is crucial to enhancing user satisfaction and ensuring the system functions effectively and sustainably in real-world settings.

### *Practical Implications*

Improving the quality of service in E-SISMAL is essential to increase user satisfaction. System managers need to ensure a quick response to user complaints, improve system reliability, and provide easily accessible technical support. Implementation of a 24/7 helpdesk or regular training for health workers can help improve service quality and ensure continued use of the system. With better service support, health workers will be more confident in using the system, resulting in more accurate and efficient data reporting.

In addition, the ease of use of E-SISMAL should be a major focus in its development. Simpler interface design, intuitive navigation, and automation features can reduce the workload of health workers in entering data. Providing tutorials or short training can also improve users' understanding of the system, making them more comfortable in using it. If the system is easy to use, health workers will be more productive in carrying out their duties, which ultimately contributes to the effectiveness of malaria prevention programs.

User satisfaction has a direct impact on the effectiveness and performance of E-SISMAL in supporting malaria prevention. Therefore, regular evaluation of user feedback is necessary to improve the most needed features of the system. With increased user satisfaction, health workers will be more

motivated to use the system consistently, thereby improving the accuracy and completeness of the data collected. This will strengthen data-driven decision-making in malaria control programs.

In conclusion, to improve the performance of E-SISMAL in malaria prevention, system managers should focus on improving service quality, ensuring ease of use, and paying attention to user satisfaction so that this system can function optimally in the real world.

## Conclusion

This study evaluated how perceived quality, perceived ease of use, and perceived usefulness affect the performance of the E-SISMAL system in West Papua, using the TTF, TAM, and DeLone & McLean IS Success models. Findings show that service quality and perceived ease of use significantly impact user satisfaction, which in turn improves system performance. Conversely, information quality, system quality, and perceived usefulness did not show a notable effect, highlighting the greater importance of usability and service responsiveness.

Theoretically, this research confirms user satisfaction as a key mediator between system perceptions and performance impact. Perceived ease of use was more influential than perceived usefulness—especially in areas with infrastructure limitations. The low  $R^2$  value for performance impact also indicates that other factors, like digital skills and institutional support, should be included in future studies.

From an implementation standpoint, the results point to the need for better service support, training, and user-friendly system design. Enhancing ease of use and providing accessible assistance can boost satisfaction and consistent usage. Regular feedback should also guide future system improvements to align with user needs.

In conclusion, while E-SISMAL holds potential in malaria control, its performance is currently limited by service and usability issues. Addressing these through targeted improvements can enhance its effectiveness. Future research should consider broader contextual and organizational factors to provide a fuller understanding of system success.

## Limitations And Future Research Directions

This study has several limitations. The scope of the study only focuses on health workers in West Papua Province, so the results have limitations in generalizing to other regions with different infrastructure conditions. In addition, the quantitative approach with PLS-SEM used in this study does not allow exploration of qualitative aspects, such as users' subjective experiences and perceptions of E-SISMAL, which cannot be explained in depth. Furthermore, this study only considers Perceived Quality as the main factor affecting satisfaction and system performance, without taking into account external factors such as government policies, infrastructure readiness, and organizational support. Then, one of the main limitations in this study is the low R-Square value of the variables tested, such as the R-square value of 0.116 for Impact of Performance. These factors can play an important role in the effectiveness of health information systems, so they need to be considered in future research.

Future research should cover a wider area to obtain more representative results. In addition, a mixed-method approach that combines quantitative and qualitative analysis can be used to gain deeper insights into user challenges and experiences in using E-SISMAL. Then, the relatively low  $R^2$  value for Impact of Performance (0.116) suggests the presence of other influential variables not captured in the current model. Future studies should consider incorporating constructs such as organizational support, infrastructure readiness, leadership involvement, training quality, and digital literacy. These variables may provide a more comprehensive explanation of how health information systems like E-SISMAL affect performance outcomes in malaria prevention programs.

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